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(54) Title: GELATIN REPLACEMENT COMPOSITION

(57) Abstract

A gelling composition comprising a blend of an alginate (A), a hydrocolloid (B) and a galactomannan (C), wherein the ratio by weight of A:(B+C) is about 0.1:1 to about 1.5:1 and the ratio by weight of B:C is about 0.8:1 to about 1.2:1. A gel composition employing the gelling composition of this invention and a food product comprising one or more food ingredients and the gelling composition described above is also disclosed.

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TITLE

GELATIN REPLACEMENT COMPOSITION

BACKGROUND OF THE INVENTION

Field of the Invention

This invention is related to a gelling composition comprising alginate, hydrocolloid and galactomannan in amounts effective to provide a suitable gelatin replacement composition. The invention is also related to food products containing such novel gelling compositions.

Related Background Art

Gelatin is used in combination with other food ingredients in a wide range of products. In particular, the presence of gelatin in food products presents a familiar suite of impressions to the consumer including its texture, appearance and effects on flavor. However, in some applications an alternative to gelatin is desirable, for example in the production of vegetarian or kosher products.

The use of gellan gum as a gelling agent in food products is well-known. However, gellan gum produces hard, brittle gels that require substantial modification to produce a composition having a texture resembling that of gelatin. Xanthan gum and locust bean gum ("LBG") are typically added to the gellan gum, as described in U.S. Patent No. 4,647,470, to produce a gelling agent having similar mechanical and textural properties to gelatin. The use of these agents, however, results in other undesirable properties. In particular, the addition of xanthan gum and LBG in amounts sufficient to produce a suitable texture results in measurable adverse effects on other desirable properties such as flavor release.

Other attempts to provide gelatin replacements have been made. For example, U.S. Patent No. 4,746,528 discloses a gellable composition comprising a mixture of (1) gellan gum, (2) xanthan gum and (3) a galactomannan and/or glucomannan gum capable of producing a gel in combination with xanthan gum, especially carob, tara, cassia or konjac gum, wherein the ratio by weight of (1):[(2)+(3)] is 1:≥2.

Despite the compositions described above, a need still exists for suitable gelatin replacements having superior characteristics to those known in the art.

SUMMARY OF THE INVENTION

The present invention provides a gelling composition comprising a blend of an alginate (A), a hydrocolloid (B) and a galactomannan (C), wherein the ratio by weight of A:(B+C) is about 0.1:1 to about 1.5:1 and the ratio by weight of B:C is about 0.8:1 to about 1.2:1.

This invention also provides a food product comprising one or more food ingredients and a gelling composition, wherein the gelling composition comprises a blend of an alginate (A), a hydrocolloid (B) and a galactomannan (C), wherein the ratio by weight of A:(B+C) is about 0.1:1 to about 1.5:1 and the ratio by weight of B:C is about 0.8:1 to about 1.2:1.

The compositions of the present invention exhibit properties similar to gelatin over a wide range of concentrations and exhibit a more rapid set time than gelatin. Another advantage of the composition of the present invention is that the composition, once formulated, does not require refrigeration. The compositions of the present invention are useful in ready-to-eat or dry mixture dessert gel formulations and as gelatin replacements or alternatives; in yogurts, puddings, marshmallow cream; pet foods and restructured meats; beverages; toppings, sauces and gravies; pastry and dessert fillings; vegetable, fruit and fish gels; and in spreadable food products such as sour cream, jellies, jams and low-calorie jellies and jams.

DETAILED DESCRIPTION OF THE INVENTION

This invention provides a gelling composition comprising a blend of an alginate (A), a hydrocolloid (B) and a galactomannan (C), wherein the ratio by weight of A:(B+C) comprises about 0.1:1 to about 1.5:1 and the ratio by weight of B:C is about 0.8:1 to about 1.2:1.

The preferred range of the ratio by weight of A:(B+C) will vary depending on the desired application of the gelling composition. For example, in one particularly

preferred embodiment, the ratio by weight of A:(B+C) is about 0.5:1 to about 1:1.

Alginates are polysaccharides prepared from brown seaweeds such as the giant kelp, *Macrocystis pyrifera*, which is one of the principal sources of the world's algin supply. Alginates are also derived from several varieties of *Laminaria* (e.g., *Laminaria digitata* or horsetail kelp, *L. saccharina* or sugar kelp and *L. hyperborea*), *Ecklonia* (e.g., *E. cava*), *Eisenia bicyclis* and *Ascophyllum nodosum*. The sodium salt of alginic acid, sodium alginate, is available from the Nutrasweet/Kelco Company, San Diego, California, under such trade names as KELTONE® (KELTONE®HV, KELTONE®LV), MANUGEL® (MANUGEL®DMB), and as the propylene glycol esters of alginic acid under the KELCOLOID® trade name.

The alginates are characterized by a unique combination of sugars, mannuronic and guluronic acid, in varying ratios among the different seaweeds. The ratio of mannuronic to guluronic acid or "M/G ratio" significantly affects the physical properties of the gel which forms in the presence of divalent cations (e.g., calcium, magnesium). "High G" alginates such as from *L. hyperborea* form relatively hard, brittle gels, while "low G" alginates such as from *A. nodosum* form relatively softer, more elastic gels. Thus, a variety of alginates are available to optimize the physical properties of the gel in a particular application.

In one preferred embodiment of this invention, the alginate is derived from giant kelp. In another preferred embodiment, the alginate is a low G alginate. Low G alginates such as those produced from *A. nodosum* are particularly useful in beverage applications. In yet another preferred embodiment, the alginate is a High G alginate such as from *L. hyperborea*. In still

another preferred embodiment, the alginate is a propylene glycol alginate. Propylene glycol alginates are commercially available from the Nutrasweet/Kelco Company, San Diego, California, under the trade names KELCOLOID®HVF, KELCOLOID®LVF, KELCOLOID®DH, KELCOLOID®S and KELCOLOID®O. The commercially available alginates encompass a broad range of molecular weights and mechanical properties, and it is to be understood that this invention includes the use of any of the commercially available alginates.

Hydrocolloids that are useful in this invention include, for example, xanthan gum and the like. Xanthan gum is an extracellular polysaccharide produced during fermentation of carbohydrates by *Xanthamonas campestris* and other bacteria of the genus *Xanthamonas*. The gum is manufactured in industrial scale and is used widely as, for example, a thickener in foods. Xanthan gum is produced and sold by the Nutrasweet/Kelco Company under the trade name Keltrol®T. Xanthan gum may be clarified for use in applications where clarity is particularly desirable. Clarification may be accomplished by means well-known in the art including physical, chemical and enzymatic clarification methods. Preferably, the hydrocolloid is clarified. A suitable, commercially available alternative to xanthan gum is carrageenan, a galactose-containing polysaccharide derived from red seaweed.

Exemplary sources of galactomannan that are useful in this invention include locust bean gum, tara gum and guar gum. Locust bean gum (LBG) is an extract of the locust bean or carob, *Ceratonia siligua*. LBG is commercially available and used as a stabilizer in foods such as ice cream, sausages, and cheese. Chemically, LBG is a galactomannan. Any gel-forming galactomannan may be suitable for use in the invention.

As previously indicated, other examples of galactomannans suitable for use in the invention include but are not limited to tara gum and guar gum. Tara gum is a vegetable gum derived from the seed of the legume *Cesalpinia spinosa*. Guar gum is also a vegetable gum, which is derived from the seed of the legume *Cyamopsis tetragonolobus*. For applications in which clarity is desirable, the galactomannan usually must be clarified. Clarification may be accomplished by means well-known in the art including physical, chemical and enzymatic clarification methods. Clarified LBG is commercially available from CNI (France). Preferably, the galactomannan used in this invention is clarified.

In yet another embodiment the invention comprises a gel composition comprising about 0.01 percent to about 4 percent by weight of any of the gelling compositions of this invention, and water. The amount of the gelling composition will vary depending on the nature of the gel composition. In an embodiment of the gel composition of this invention, the ratio by weight of A:(B+C) is about 0.5:1 to about 1:1. In another embodiment, the ratio by weight of A:(B+C) is about 1:1 to about 1.5:1.

In the present invention, the term "gel composition" encompasses any composition or food product containing a gelling composition and water. It is to be understood that the gel compositions referred to herein may contain in addition to the gelling composition and water, any number of flavoring or food ingredients, as well as sweeteners, stabilizers, preservatives, etc. necessary to the particular application of the gel composition. In an embodiment, the alginate is derived from giant kelp. In another embodiment, the hydrocolloid is xanthan gum. Preferably, the

hydrocolloid is clarified. In yet another embodiment, the galactomannan is selected from the group consisting of locust bean gum, tara gum or guar gum. Preferably, the galactomannan is clarified.

Sweeteners that may be employed include, without limitation, aspartame, acesulfame-K, sucralose, saccharin, alitame, cyclamates, stevia derivatives, thaumatin, sucrose (liquid and granulated), high fructose corn syrup, high conversion corn syrup, crystalline fructose, glucose (dextrose), polyol sugar alcohols, invert sugar and mixtures thereof.

In an embodiment of the invention, the gel composition contains gelling composition in an amount of about 0.01 percent to about 0.3 percent by weight of the gel composition. In another embodiment, the gel composition contains gelling composition in an amount of about 0.3 percent to about 0.5 percent by weight of the gel composition. In yet another embodiment, the gel composition contains gelling composition in an amount of about 0.5 percent to about 1 percent by weight of the gel composition. In a still further embodiment, the gel composition contains gelling composition in an amount of about 1 percent to about 4 percent by weight of the gel composition.

A particularly preferred gel composition is a food product comprising one or more food ingredients and a gelling composition, wherein the gelling composition comprises a blend of an alginate (A), a hydrocolloid (B) and a galactomannan (C), wherein the ratio by weight of A:(B+C) comprises about 0.1:1 to about 1.5:1 and the ratio by weight of B:C is about 0.8:1 to about 1.2:1.

In a preferred embodiment, the food ingredient is selected from the group consisting of dairy products, sour cream, yogurt, pudding, beverages, toppings, sauces, gravies, pet foods, restructured meats, aspics, dessert gel formulations, dessert fillings, pastry fillings, vegetable gels, fruit gels, fish gels, jellies, jams and mixtures thereof. The preferred ratio of A:(B+C) will depend on the particular food ingredient(s) with which the gelling composition is used.

One preferred embodiment of the food product of the present invention includes a gelling composition having a ratio by weight of A:(B+C) of about 0.5:1 to about 1:1. However, certain food products may preferably include a gelling composition having a weight ratio of A:(B+C) lower than 0.5:1, e.g., pet foods, or greater than 1:1, e.g., puddings and jellies.

The food product of this invention generally contains from about 0.01 percent to about 4 percent by weight of the food product. Again, the preferred concentration of the gelling composition in the food product will depend upon the nature of the food product. For example, sour cream, low fat yogurt, chocolate pudding, imitation mayonnaise and marshmallow cream will typically contain the gelling composition in an amount from about 0.01 percent to about 0.3 percent by weight of the food product. On the other hand, pet foods may be preferably formulated with the gelling composition in an amount from about 0.3 percent to about 0.5 percent by weight of the food product.

In yet another example, dessert gels or aspics will typically contain the gelling composition in an amount from about 0.5 percent to about 1 percent by weight of the food product. In yet a further example, jelly

candy preferably contains the gelling composition in an amount from about 1 percent to about 4 percent by weight of the food product. The exact amount of gelling composition to be employed in the food product can be readily ascertained by one of ordinary skill in the art.

In particularly preferred examples, this invention provides a food product comprising a gelling composition, wherein the gelling composition comprises an amount from about 0.3 percent to about 0.5 percent by weight of the food product, and wherein the ratio of A:(B+C) is less than about 0.5:1. In another particularly preferred example, a food product is provided wherein the gelling composition is present in an amount from about 0.01 percent to about 0.3 percent by weight of the food product, and the ratio of A:(B+C) is greater than about 0.5:1. In yet another particularly preferred example, a food product is provided wherein the gelling composition is present in an amount from about 0.5 percent to about 1 percent by weight of the food product, and the ratio of A:(B+C) is about 0.5:1 to about 1:1. In a still further preferred example, a food product is provided wherein the gelling composition is present in an amount from about 1 percent to about 4 percent by weight of the food product and the ratio of A:(B+C) is greater than about 1:1.

In formulating the compositions and food products of the present invention, typical pH modifiers, such as citric acid or maleic acid, sweeteners, such as natural and high intensity sweeteners, preservatives, such as sodium benzoate, flavorings such as flavor emulsion bases, other common additives such as sodium citrate and ascorbic acid, and colorings, may also be added to the compositions of the present invention.

Processes for blending the various ingredients of the compositions and producing the food products of the present invention are well-known in the art and include but are not limited to dry blending and wet blending such as in agglomeration/hydration followed by drying (e.g., spray drying, fluidized bed drying or drum drying). It is also well-known that water quality may vary widely across the consumer market, thus, sequestration agents such as sodium hexametaphosphate may be added to the compositions in order to allow for consistency and ease of use in differing markets.

Texture Profile Analysis

The texture profile of a gel can be evaluated in terms of four parameters: modulus, hardness, brittleness and elasticity. These are standard gel properties evaluated in Texture Profile Analysis, or "TPA," that are determined by methods well-known in the art, for example on an Instron 4201 Universal Testing Machine, which compresses the sample to about ¼ of its original height two times in succession. The sample is compressed twice so that the amount of structure breakdown can be determined.

Modulus is the first parameter that is determined when testing a sample. The modulus is the initial slope of the force-deformation curve. This is a measure of how the sample behaves when compressed a small amount. The modulus usually correlates closely with a sensory perception of the sample's firmness. Modulus is expressed in units of force per unit area (pounds per square inch or Newton's per square centimeter).

Hardness is defined as the maximum force that occurs at any time during the first compression cycle. It may occur when the gel initially breaks, or it may occur

later in the test as the sample is flattened and deformed. In most cases, the hardness is correlated to the rupture strength of the material. It is expressed in units of force (pounds or Newtons).

Brittleness is defined as the first significant drop in the force-deformation curve during the first compression cycle. This is the point of first fracture or cracking of the sample. A gel that fractures early in the compression cycle is considered to be more brittle or fragile than one that breaks later. Brittleness is measured as the percent strain required to break the gel. As the number gets smaller, it indicates a more brittle gel at a lower strain level.

Following the first compression cycle, the force is removed from the sample as the Instron crosshead moves back up.

A measure of the sample's elasticity is taken as the second compression cycle is begun. By noting where the force begins to increase during this second compression cycle, a measure of the sample height may be obtained. If the sample returned to its original height, the elasticity would be 100%. The elasticity is a measure of how much the original structure of the sample was broken down by the initial compression. In sensory terms, it can be thought of as how "rubbery" the sample will feel in the mouth. The units are dimensionless and are expressed as a percentage.

The following examples are intended to illustrate certain embodiments of the invention, and no limitation of the invention is to be implied.

Experimental Examples

The gel compositions used to perform the texture profile analyses reported in Table 1 (Examples 1 - 6) were prepared by adding to heated water, with stirring, a dry mixture comprising a gelling composition and a flavor blend, in the manner described in detail below. The ingredients used in these preparations and the preparations of Examples 7-14 (*infra*) are well known to those of ordinary skill in the art and commercially available.

Examples 1 - 6

The gelling composition component of the dry mixture comprised alginate (KELTONE®HV or MANUGEL®DMB), xanthan gum (KELTROL®T), and clarified LBG in the ratios set forth in Table 1, with the exception of comparative example 1, in which the gelling composition was gelatin.

The flavor blend component of the dry mixture comprised: sugar (sucrose) 93.27%, adipic acid 3.38%, sodium citrate 3.20%, strawberry flavor 0.123%, and FD&C Red 0.027%. In the sugar free example (Example 6), the sucrose was replaced with a composition comprising a low-calorie bulking agent (filler) with a high intensity sweetener (e.g., Nutrasweet aspartame at a final concentration of 0.8%, with maltodextrin at a final concentration of 14%). Other high intensity sweeteners and blends thereof may also be used, as well as various blends of high intensity sweeteners and sugar.

The amount of gelling composition in each dry mixture was based on the final percentage of gelling composition reported in Table 1, and a total final weight of 558 grams (473 grams water and 85 grams dry

mixture). For example, in comparative example 1, the gelling composition was gelatin, used at a final concentration of 1.3%, so that the amount of gelatin used was:

1.3% gelatin = 0.013 x 558 g = 7.254 g gelatin.

Flavor blend was then added to the gelling composition to bring up to 85 grams the weight of dry mixture in each example. In the gelatin example described above, the amount of flavor blend added to produce the dry mixture was:

85 g - 7.254 g gelatin = 77.746 g flavor blend.

The samples tested using TPA were prepared by heating 473 grams of water (about two cups) to 85°C in an electrically heated hot cup. For each sample, a dry mixture comprising gelling composition and flavor blend, prepared as described above, was added to the water while stirring with a 3-blade, 2-inch diameter prop mixer set to about 800 rpm. The sample was held at this temperature for 5 minutes with continued stirring to ensure complete hydration of all ingredients. The hot cup was removed from the stirrer and hot water added back to make up for the volume lost to evaporation. The sample was stirred for an additional 30 seconds, then immediately poured into 1 inch diameter x 0.50 inch tall plastic ring gel molds. The mold was immediately covered with a plastic cover slip to prevent evaporation and placed into a refrigerator for about 18 hours. For TPA (Texture Profile Analysis, supra), a minimum of 7 rings were prepared for each sample. After about 18 hours, the samples were removed from the refrigerator and the gel carefully removed from the plastic ring mold and evaluated using TPA with an Instron Universal Tester. The results are set forth in Table 1.

Table 1. Texture analysis of alginate gels.

	Comparative example 1	Ex. 1	Ex. 2	Ex. 3
Gelling composition	Gelatin Control	KELTONE®[1]/ KELTROL®[2]/ Clar. LBG[3]	KELTONE®/ KELTROL®/ Clar. LBG	KELTONE®/ KELTROL®/ Clar. LBG
ratio % total	N/A 1.30%	2:1:1 0.8%	2:1:1 0.8%	2:1:1 0.8%
Other ingredients	-	-	DCPA[4] 0.06%	Calgon[5] 0.05%
TPA Parameter				
Modulus	3185	2582	3221	2563
Hardness	3.23	3.95	4.61	7.14
Brittleness	70.50	67.05	61.74	70.07
Elasticity	27.6	30.5	33.3	43.1
Cohesive	7.51	16.8	12.86	17.33

Table 1 (continued)	Ex. 4	Ex. 5	Ex. 6
Gelling composition	KELTONE®/ KELTROL®/ Clar. LBG	MANUGEL®[6]/ KELTROL®/ Clar. LBG	(Sugar Free) KELTONE®/ KELTROL®/ Clar. LBG
ratio % total	1:1:1 0.8%	1:1:1 0.8%	1:1:1 0.8%
Other ingredients	DCPA 0.06%	DCPA 0.06	DCPA 0.06
TPA Parameter			
Modulus	2947	3176	2922
Hardness	6.03	3.29	2.8
Brittleness	74.72	61.7	57.45
Elasticity	35.0	24.3	33.0
Cohesive	16.2	11.7	14.3

[1]KELTONE® - sodium alginate (KELTONE®HV)

[2]KELTROL® - Xanthan gum (KELTROL®T)

[3]Clar. LBG - Clarified locust bean gum

[4]DCPA - dicalcium phosphate anhydrous (calcium source)

[5]Calgon - Sodium hexametaphosphate (sequestrant)

[6]MANUGEL® - sodium alginate (MANUGEL®DMB)

Example 7 - Sour Cream

A sour cream composition was prepared by:

(1) adding 594.48 g of non-fat milk and 558 g of manufacturing cream (40% butterfat) to a mixing vessel, then adding 30 g non-fat milk solids, followed by heating the mixture to 49°C (120°F);

(2) adding 0.90 g Keltone HV, 1.20 g Kelgum (1:1 LBG:xanthan gum, Nutrasweet/Kelco, San Diego CA), and 2.40 g 74K Emulsifier (American Ingredients, Kansas City, MO) and hydrating the mixture under agitation;

(3) heating the mixture to 60-71°C (140-160°F) to partially pasteurize the mixture;

(4) preheating a homogenizer with boiling water and homogenizing the mixture in two stages (first stage 2000 psi; second stage 500 psi);

(5) pasteurizing the homogenized mixture at 85°C (185°F) for 5 minutes, and cooling to 23°C (74°F);

(7) inoculating with 12.00 g DSG 2000-30 starter culture (Hansen, Los Angeles, CA);

(8) filling clean containers;

(9) incubating at 22°C (72°F) for 14 -16 hours or until a total acidity of 0.70% or pH 4.5; and

(10) cooling to 4°C (40°F).

In this type of composition, the gelatin level would be 0.4% of a 250 Bloom type.

Ingredients - Ex. 7 - Sour Cream	Grams	Percent
Milk, non-fat	594.48	49.58
Manufacturing Cream, 40% butterfat	558.00	46.54
Milk solids, non-fat	30.00	2.50
DSG 2000 - 30 starter culture (Hansen)	12.00	1.00
74K emulsifier (American Ingredients)	2.40	0.20
Keltone HV	0.90	0.08
Kelgum	1.20	0.10
Total	1202.88	100.00

Example 8 - Low Fat Yogurt

A low fat yogurt was prepared by:

(1) preblending all ingredients listed below including the milk solids, sugar, the gums, and the pectin;

(2) adding 20.16 g ISOSWEET 100 high fructose corn syrup (Staley, Decatur, IL) to 1065.84 g milk (2% fat) under moderate stirring to prevent air entrainment (<350 rpm with a propeller mixer);

(3) adding the dry blend of step (1) slowly to the milk-fructose solution in a 2 liter stainless steel container in a double boiler arrangement on a stove with moderate stirring;

(4) heating the mixture to 60 - 71°C (140 - 160°F) to partially pasteurize it;

(5) preheating the homogenizer with boiling water and homogenizing the mixture with a two-stage process (2000 psi first stage and 500 psi second stage);

(6) pasteurizing the homogenized mixture at 88°C (190°F) for 8 minutes;

(7) cooling the mixture to 40 - 41°C (104 - 106°F);

(8) inoculating the mixture with starter culture using sterile utensils, by completely stirring in the culture (≥10 minutes with moderate agitation); and

(9) incubating the mixture at 40 - 41°C (104 - 106°F) until the pH reaches 4.5 - 4.2 (3½ - 5 hours) in sanitized containers.

Ingredients - Ex. 8 - Low fat yogurt	Grams	Percent
Milk, 2% fat	1065.84	88.77
Milk solids, non-fat powder	48.72	4.06
Sugar, granular	47.88	3.99
ISOSWEET 100 high fructose corn syrup (Staley)	20.16	1.68
YC 180 starter culture (Hansen)	15.60	1.30
Low-methoxy pectin 104AS (Aqualon, Wilmington, DE)	1.20	0.10
Keltone HV	0.60	0.05
Kelgum	0.60	0.05
Total	1200.60	100.00

Example 9 - Chocolate Pudding

A chocolate pudding was prepared by:

(1) blending all dry ingredients together and sifting;

(2) placing the dry ingredients in a saucepan and gradually adding 7°C (45°F) milk while stirring;

(3) heating the mixture on a stove over low heat and gradually bringing to a boil while on low heat, stirring constantly;

(4) As soon as the mixture starts to boil, immediately pouring into pudding dishes and cooling at room temperature or refrigerating for 20 - 30 minutes.

Ingredients - Ex. 9 - Chocolate Pudding	Grams	Percent
Sugar, granular	58.32	10.39
COKAY #35 Dutch cocoa	12.01	2.14
CLEARJEL modified waxy maize starch (National Starch, Bridgewater, NJ)	8.42	1.50
MELOJEL corn starch (National Starch)	5.61	1.00
Tetrasodium pyrophosphate	2.02	0.36
Keltone HV	0.56	0.10
Kelgum	0.42	0.075
Salt	0.56	0.10
Calcium Sulfate	0.50	0.09
Whole Milk, 2 cups	473.09	84.28
Total	561.51	100.00

Example 10 - Imitation Mayonnaise

An imitation mayonnaise was prepared by:

(1) dry blending all dry ingredients listed below except the salt;

(2) adding the dry blend to 724 g water;

(3) mixing at medium speed until the mixture is homogeneous (3 - 5 minutes);

(4) adding 40 g salt and mixing for 1 minute;

(5) adding 80 g fresh egg yolk and mixing for 5 minutes;

(6) adding 800 g vegetable oil and mixing for 3 minutes with increased mixing speed;

(7) adding 160 g vinegar and mixing for 3 minutes to obtain a crude emulsion with no separation;

(8) homogenizing the mixture using a colloid mill with a setting of 0.25 mm (0.01 in), using if necessary a pump to force the mixture through the mill.

Ingredients - Ex. 10 - Imitation Mayonnaise	Grams	Percent
Vegetable oil, soybean	800.00	39.92
Water	724.00	36.12
Vinegar, white, 10% (100 grain)	160.00	7.98
Sugar, granular	140.00	6.99
Egg yolks, fresh	80.00	3.99
ULTRA - TEX 4 instant starch (National Starch)	40.00	2.00
Salt	40.00	2.00
Mustard powder	10.00	0.50
Sodium citrate, hydrous (Pfizer, Groton, CT)	4.00	0.20
Keltone HV	2.00	0.10
Kelgum	4.00	0.20
Total	2004.00	100.00

Example 11 - Marshmallow Creme

A marshmallow creme was prepared by:

A. Preparing "Part 1" as follows:

(1) dry blending 1.5 g Keltone HV and 2.00 g Kelgum with approximately 5 % of the sugar (~12.55 g) allotted to the preparation of Part 1, dispersing the blend in 343.6 g water with good mechanical stirring;

(2) stirring and heating the solution to 80°C (176°F) until the gum blend is completely hydrated (about 10 minutes);

(3) dry - blending the remaining sugar (~238.45 g) and 1.00 g calcium chloride and adding the resulting dry blend to the hydrated gum blend

or step A(1) and continuing to mix for one minute;

(4) slowly adding 1400 g corn syrup (42 DE, Staley) to the mixture while maintaining the temperature at 80°C (176°F);

(5) heating the mixture to 99°C (210°F) and continuing heating until the soluble solids reach 78% (BRIX 78) as determined by a hand held refractometer; and

(6) cooling the mixture to about 54°C (130°F) before combining with Part 2;

B. Preparing "Part 2" as follows:

(1) slowly adding 88.5 g egg white solids to water;

(2) adding 177 g sugar and continuing to mix until homogenous (about 30 minutes);

(3) storing in a refrigerator (4°C) until ready for use;

C. Combining Part 1 and Part 2 as follows:

(1) combining 925.0 g of Part 1 (cooled to about 54°C (130°F) and 75.0 g of Part 2 (warmed to room temperature), using a 5 - quart Hobart mixer at the lowest speed and equipped with a wire whip;

(2) adding vanillin and continuing to mix for one minute;

(3) cooling to 4°C (120°F), whipping at high speed to approximately 100 - 120% overrun.

Ingredients - Ex. 11 - Marshmallow Creme	Grams	Percent
1. Sugar syrup base		
Corn syrup, 42 DE Staley 1300	1400	70.018
Water	343.6	17.184
Sugar, granular	251	12.553
Keltone HV	1.50	0.075
Kelgum	2.00	0.100
Calcium chloride, dihydrate powdered	1.00	0.050
Vanillin	0.4	0.020
Total	1999.5	100.00
2. Egg syrup base		
Water	734.5	73.45
Sugar, granular	177	17.70
P20 egg white solids (Henningsen Foods, Omaha, NB)	88.5	8.85
Total	1000	100.00

Example 12 - Jelly Candy

A jelly candy was prepared by:

(1) placing 700 g deionized water in the cooking kettle and adding 2.50 g sodium citrate;

(2) dry blending 22.80 g Keltone HV and 18.20 g Kelgum with 98.0 g of the sugar and mixing the blend into the water/sodium citrate solution of step (1);

(3) continuing to stir while heating to boiling and holding at boiling for one minute;

(4) slowly adding 330 g 42 DE Staley 1300 corn syrup and 330 g 62 DE Staley 4300 corn syrup and the remainder of the sugar while not breaking the boil;

(5) adding 0.5 g calcium phosphate monobasic (Mallinckrodt, St. Louis, Missouri) and 1.40 g disodium dihydrogen pyrophosphate (Solutia, St. Louis, MO);

(6) cooking to approximately 76% BRIX [(~ 107°C) ~ 224°F];

(7) adding 0.10 g FD&C Yellow #6, 10% solution, 0.83 g natural and artificial orange flavor #13512935 (IFF, Dayton, NJ), 0.05 g 3FUB lecithin (Central Soya, Ft. Wayne, IN) and 8.20 g citric acid solution (40% hydrous-monohydrate, Pfizer) and mixing thoroughly;

(8) depositing the mixture into warm, dry starch molds and heating at 40 - 43°C (105 - 110°F) for 40 hours; and

(9) removing candies from the starch mold and brushing off the starch, followed by steaming and sugar sanding.

Ingredients - Ex. 12 - Jelly Candy	Grams	Percent
Water, deionized	700.00	38.302
Sugar, granular	413.00	22.598
Corn syrup, 42 DE Staley 1300	330.00	18.056
Corn syrup, 62 DE Staley 4300	330.00	18.056
Keltone HV	22.80	1.248
Kelgum	18.20	.996
Citric acid solution, 40% hydrous-monohydrate (Pfizer)	8.20	.449
Sodium citrate, hydrous (Pfizer)	2.50	.137
disodium dihydrogen pyrophosphate (Solutia)	1.40	.077
Natural & artificial orange flavor	0.83	.045
Calcium phosphate, monobasic (Mallinckrodt)	0.52	.028
FD&C Yellow #6, 10% solution	0.10	.005
Lecithin, 3FUB (Central Soya)	0.05	.003
Total	1827.60	100.00

Example 13 - Canned Pet Food

A canned pet food composition was prepared by:

(1) blending 1.50 g Keltone HV, 2.50 g Kelgum and 5.00 g SUPERCOL G2H guar gum (Rhodia, Cranbury, NJ) and dispersing in cold water with shear, continuing mixing for 10 minutes;

(2) adding the gum dispersion of step (1) to cold (4°C) meat and mixing well; and

(3) sealing the product in cans, followed by retort at 121°C (250°F) for 60 minutes.

Ingredients - Ex. 13 - Canned Pet Food	Grams	Percent
Meat (Offals or hamburger)	700.00	69.90
Water	292.40	29.20
SUPERCOL G2H guar gum (Rhodia)	5.00	0.50
Keltone HV	1.50	0.15
Kelgum	2.50	0.25
Total	1001.40	100.00

Example 14 - Savory (Meat Flavored) Food Aspic

A meat flavored food aspic was prepared by:

(1) dispersing 1.00 g Keltone HV and 1.25 g Kelgum in 496 g water using high shear and, while stirring, heating the dispersion to 80°C (176°F) and holding the solution at 80°C for 10 minutes;

(2) adding to the dispersion of step (1) 0.50 g calcium sulfate, 1.5 g salt and 1.5 g MAGGI #7821 hydrolyzed plant protein beef flavor (L.J. Minor, Cleveland, OH), mixing for 1 minute; and

(3) pouring into appropriate containers, then allowing to cool to room temperature or chill.

Ingredients - Ex. 14 - Savory (Meat Flavored) Food Aspic	Grams	Percent
Water	496	98.854
MAGGI #7821 hydrolyzed plant protein beef flavor (L.J. Minor)	1.50	0.299
Keltone HV	1.00	0.199
Kelgum	1.25	0.249
Salt	1.5	0.299
calcium sulfate	0.50	0.100
Total	501.75	100.00

Other variations and modifications of this invention will be obvious to those skilled in the art. This invention is not limited except as set forth in the claims.

What is claimed is:

1. A gelling composition comprising a blend of an alginate (A), a hydrocolloid (B) and a galactomannan (C), wherein the ratio by weight of A:(B+C) is about 0.1:1 to about 1.5:1 and the ratio by weight of B:C is about 0.8:1 to about 1.2:1.

2. A gelling composition of claim 1, wherein the ratio by weight of A:(B+C) is about 0.5:1 to about 1:1.

3. A gelling composition of claim 1, wherein the alginate is derived from giant kelp.

4. A gelling composition of claim 1, wherein the hydrocolloid is xanthan gum.

5. A gelling composition of claim 1, wherein the galactomannan is selected from the group consisting of locust bean gum, tara gum or guar gum.

6. A gelling composition of claim 1, wherein the hydrocolloid is clarified.

7. A gelling composition of claim 1, wherein the galactomannan is clarified.

8. A gel composition comprising
   (i) about 0.1 percent to about 4 percent by weight of a blend of an alginate (A), a hydrocolloid (B) and a galactomannan (C), wherein the ratio by weight of A:(B+C) is about 0.1:1 to about 1.5:1 and the ratio by weight of B:C is about 0.8:1 to about 1.2:1; and

(ii) water.

9. A gel composition of claim 8, wherein the ratio by weight of A:(B+C) is about 0.5:1 to about 1:1.

10. A gel composition of claim 8, wherein the ratio by weight of A:(B+C) is about 1:1 to about 1.5:1.

11. A gel composition of claim 8, wherein said gelling composition is present in an amount of about 0.01 percent to about 0.3 percent by weight of the gel composition.

12. A gel composition of claim 8, wherein said gelling composition is present in an amount of about 0.3 percent to about 0.5 percent by weight of the gel composition.

13. A gel composition of claim 8, wherein said gelling composition is present in an amount of about 0.5 percent to about 1 percent by weight of the gel composition.

14. A gel composition of claim 8, wherein said gelling composition is present in an amount of about 1 percent to about 4 percent by weight of the gel composition.

15. A gel composition of claim 8, wherein the alginate is derived from giant kelp.

16. A gel composition of claim 8, wherein the hydrocolloid is xanthan gum.

17. A gel composition of claim 8, wherein the galactomannan is selected from the group

consisting of locust bean gum, tara gum or guar gum.

18. A gel composition of claim 8, wherein the hydrocolloid is clarified.

19. A gel composition of claim 8, wherein the galactomannan is clarified.

20. A gel composition of claim 8, further comprising at least one sweetener in an amount effective to sweeten the composition.

21. A food product comprising one or more food ingredients and a gelling composition, wherein the gelling composition comprises a blend of an alginate (A), a hydrocolloid (B) and a galactomannan (C), wherein the ratio by weight of A:(B+C) is about 0.1:1 to about 1.5:1, and the ratio by weight of B:C is about 0.8:1 to about 1.2:1.

22. A food product of claim 21, wherein the food ingredient is selected from the group consisting of dairy products, sour creams, yogurts, puddings, beverages, toppings, sauces, and gravies.

23. A food product of claim 21, wherein the food ingredient is selected from the group consisting of pet foods, restructured meats, and aspics.

24. A food product of claim 21, wherein the food ingredient is selected from the group consisting of dessert gel formulations, dessert fillings and pastry fillings.

25. A food product of claim 21, wherein the food ingredient is selected from the group consisting of vegetable gel formulations, fruit gel formulations, fish gel formulations, jelly formulations, jelly candy formulations, jam formulations and mixtures thereof.

26. A food product of claim 21, comprising an amount of the gelling composition from about 0.3 percent to about 0.5 percent by weight of the food product, wherein the ratio of A:(B+C) is less than about 0.5:1.

27. A food product of claim 21, comprising an amount of the gelling composition from about 0.01 percent to about 0.3 percent by weight of the food product, wherein the ratio of A:(B+C) is greater than about 0.5:1.

28. A food product of claim 21, comprising an amount of the gelling composition from about 0.5 percent to about 1 percent by weight of the food product, wherein the ratio of A:(B+C) is about 0.5:1 to about 1:1.

29. A food product of claim 21, comprising an amount of the gelling composition from about 1 percent to about 4 percent by weight of the food product, wherein the ratio of A:(B+C) is greater than about 1:1.

INTERNATIONAL SEARCH REPORT

Inter nal Application No
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A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A23L A23K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA	Authorized officer
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